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URINARY CALCULUS AND LITHOTOMY.*

BY THOS. W. KAY, M. D.

From the works of the early historians, we learn that vesical calculi were common in the East as early as the 2nd Century, B. C. They were so common, in fact, that specialists were recognized in Alexandria who were called lithotomists and who confined themselves entirely to the extraction of stone, an existing law prohibiting all young practitioners from undertaking the operation. It is probable that lithotomy was practiced long before this period, for Hippocrates made his disciples swear never to perform the operation. Florus, the Roman historian, states that the usurper Tryphon caused the report to be circulated that Antiochus the 6th, son of Alexander Balas, King of Syria, suffered from stone, thereby procuring an operation on him, which caused his death, about the middle of the 2nd Century, B. C.

Stone, in the East, is probably as common now as it was then, and in no section of the country is it more common than in Syria; for in spite of the native operators, the number of cases which fall into the hands of the regular practitioners is considerable.

The native method differs from "*le petit appareil*" of the old French writers (first described by Celsus), in using the median incision and employing no scoop. The operator passes one or two fingers into the rectum, hooks the stone in front, and drawing it well against the perineum, cuts down on it at the most prominent point, after which he easily forces it out.†

Of those operated upon who escape death, a large number suffer from urinary fistulæ, which are hard to cure. As an ex-

*Read before the Baltimore Medical Association, December 17, 1888.

†See a paper by the author, on the "Native Treatment of Disease in Syria," read at the Ninth International Congress, and published in the transactions of the same,

ample of the frequency of stone in Syria, I will mention that my former colleague, Prof. Geo. E. Post, during a residence of 20 years, has operated over 250 times. This represents only a small part of the work done by the American, English, French, German, Syrian and Turkish surgeons.

The frequency of stone in Syria is not due to the water, as has been thought by some to be the case, for it is as frequent in the Hauran, a volcanic district where rain-water is used, as it is in the Lebanon mountains, where the source of water is nearly entirely limestone. Nor do I think the climate directly affects its frequency, but it is chiefly due to the large number of poor who are imperfectly protected by shelter and clothing, and who eat insufficient or improper food. It is true that certain villages furnish more calculi, proportionately, than others, but then we find their inhabitants poorer and more degraded than in the neighboring villages. This I think will also be found to be the case in other countries, though it is not uncommon for calculus to occur among the wealthy classes. Calculi originate most frequently in the kidney, but sometimes in the bladder, their relative frequency being, according to Heller, as 100 to 1. Their apparent nuclei are most frequently composed of uric acid, but they may be composed of urate of ammonia, oxalate of lime, triple phosphate of ammonia and magnesia, and phosphate of lime. I say *apparent* nuclei, for I incline to the opinion that in the majority of calculi some organic substance is the nucleus around which the inorganic substance accumulates. In Egypt, where hæmaturia is very common, blood clots or the ova of the Bilharzia Hæmatobia have been found to be the nuclei in many calculi. Stone occurs most commonly in children, and as the poor are frequently subject to catarrhal and febrile attacks, it is quite possible that small particles of blood, mucus or fibrin may find their way into the urinary system, thus furnishing a nucleus for the deposit of uric acid with which the urine is heavily loaded. This can be seen in many calculi when a careful section has been made, a small cavity being left from the decomposition or desiccation of the animal substance. Colloid substances may be deposited between inorganic layers of a calculus, which, on changes taking place in the urine, swell and cause splitting of the stone. This was very prettily shown in one of my specimens,

where four of the fractured pieces were found in the urethra. In another specimen the nucleus was lying almost free in a hollow calculus due to desiccation of a thick organic layer.

Though calculi are composed, as a rule, of several layers, they are classified according to the outermost layer into two classes, the first being uric acid and the allied forms, and the second the phosphates. To these can be added a third class, containing carbonate of lime, fibrous and other rarer forms. The first class is found most frequently in ill-nourished children in whom an imperfect change of proteids into urea takes place, with a resulting increased production of uric acid. Stones of this kind are also found in persons of middle age who indulge in large quantities of nitrogenous food. Since uric acid is soluble in cold water only in the proportion of 1-14,000 to 1-15,000 parts, and slightly more so in warm water, we can readily see how a nucleus may increase in size in such individuals. The oxalate calculus has its origin in the same way, oxalic acid being produced by changes taking place in uric acid or urates already existing in the urine. The phosphates are found most frequently in adults suffering from some disease of the bladder or kidneys. Here the nucleus may be phosphatic, but in the majority of cases it is composed of uric acid, which by its presence sets up a cystitis with subsequent phosphatic deposit. As a rule, only one stone is found in the bladder, but in two of 25 cases operated on by me, more than one was found. In the one case, there were two distinct nuclei, but in the other it was due to the breaking up of the outer layers of the original stone. The calculus is generally round or oval in shape, but it varies according to circumstances. The dumb-bell shape is due to the lodging of a small calculus in the urethra, which as it grows becomes constricted by the neck of the bladder, as prettily shown in one of my specimens. Facets are not unfrequently found in calculi where several exist in the bladder at the same time. In a short paper I cannot dwell on the symptoms of stone, but for its diagnosis I will remark that I have found no searcher as valuable as a thin flexible uterine sound. It does for all ages and both sexes, and can be bent to any curve before its introduction, or after its introduction, with a finger in the rectum. It is true that it does not give as distinct "click" as Thompson's sound, but this is no more essential

for diagnosis of stone than it is for the diagnosis of necrosed bone. It is also true that some of the best surgeons have been mistaken and cut for stone when none existed, but most cases reported were probably those of "missed stone." I was called in to a case of this kind some three days after the operation was performed, and was almost on the point of pronouncing no stone present when I detected a small hard substance between the fingers of my two hands as I made a bimanual examination. The bladder had been missed at the neck and my finger was then in a cavity, closely resembling the bladder, which had been hollowed out in the loose tissue in front of the rectum.

It is not my purpose to speak of the relative merits of litholapaxy and lithotomy, nor of the different methods of lithotomy. Each has its field, and a choice must be made on the merits of each individual case—the age of the patient, the size of the stone, the condition of the genito-urinary apparatus, and the general health. Of my 25 cases, 17 were lithotomies in children, with one death from cellulitis in a child of 4 years of age, from whom I removed a $\frac{1}{2}$ oz. stone; 4 were litholapaxies in adults without a bad symptom; 1 was a lithotomy in a debilitated adult who died ten days later from diarrhœa; and three were suprapubic cystotomies, one dying from peritonitis and a second from cystitis.*

The chief dangers to be feared in operating are wounding the artery of the bulb or the internal pudic, missing the bladder by the knife slipping from the groove of the staff, or by the assistant withdrawing the staff too soon; opening up the recto-vesical fascia; wounding the rectum or bladder, and finally tearing across the urethra or pushing the bladder up out of the way while attempting to introduce the finger. Many instruments have been devised to overcome these dangers, but they are all expensive, and none of them, in my estimation, come up to the scalpel when in a careful and skillful hand. In my first three cases I used a double lithotome and lost one of my patients; since that time I have only used the scalpel, and have had the most satisfactory results—14 cases, without a bad symptom. In operating, I follow the left lateral method, but as there are several points

*See a paper by the author on "Supra-Pubic Cystotomy, with a Report of Three Cases," *Medical Times*, July, 1888.

in which I do not follow the rules laid down in text-books, I will describe it briefly: The patient having been prepared for the operation and put in the proper position, a good-sized staff is introduced till it comes in contact with the stone, and then withdrawn so that its apex just rests in the bladder. This is then given to an assistant and the first incision, 2 to 3 inches in length, made through the skin and fascia down to the muscles. Then taking the staff in the left hand, the scalpel is made to transfix the perineal muscles from about the level of the anus to the apex of the prostate gland. The transfixion is done slowly, a slight lateral motion being kept up until I am sure that the point of the scalpel is in the groove of the staff, after which both knife and staff are slid into the bladder. The staff is now left in the bladder and the knife withdrawn, the incision in the prostate and urethra not being enlarged, and that in the muscles only to the extent of about an inch. A second staff or sound is now introduced into the perineal wound and run along the groove of the first until it reaches the bladder, when it is turned over so that the convex surfaces are in contact. The condition now very much resembles that of a female bladder with two curved retractors introduced through the urethra. The first staff is now held by the assistant, and the second one in the operator's right hand, while the left index finger is wedged between the two, until it overcomes the resistance of the sphincter vesicæ and enters the bladder. The opening is now large enough to allow most stones to be extracted, but if it is not, a probe-pointed bistoury can be used to enlarge the incision, or to convert it into a bilateral operation, according to the requirements of the case. The staves can be withdrawn as soon as the finger enters the bladder, but their presence is found to materially aid the introduction of the forceps, after which the stone is extracted and the patient is treated on general principles.

The advantages of this method of operating can be readily seen. In *transfixing the perineal muscles*, the blood vessels are better avoided, the urethra is opened well back of the bulb by a small incision, and the perineal incision is small, favoring rapid healing.

By *passing staff and knife simultaneously into the bladder*, the dangers of missing the bladder, of incising the prostate to too

great an extent, or of wounding the bladder or rectum, are avoided. With the *two staves in the bladder as retractors*, there is no danger of rupturing the urethra across, of pushing the bladder up out of the way of the finger, of passing the finger between the bladder and rectum, or of injuring the neck of the bladder in introducing the forceps.

A method offering so many advantages has no doubt been adopted by others before, but as yet I have seen no description of it.

